



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/821,161

04/07/2004

Paul F. Meier

33965US1

9187

7590

04/18/2007

Richmond, Hitchcock, Fish & Dollar
PO Box 2443
Bartlesville, OK 74005

EXAMINER

DOUGLAS, JOHN CHRISTOPHER

ART UNIT

PAPER NUMBER

1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
----------------------------------------	-----------	---------------

3 MONTHS

04/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/821,161

Applicant(s)

MEIER ET AL.

Examiner

John C. Douglas

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Examiner acknowledges the response filed on 2/02/2007 containing remarks and amendments to the claims. The Examiner acknowledges claim 1 as amended. A new rejection necessitated by amendment follows:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1764

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koves (US 6146519) in view of Khare (US 5914292) and Collins (US 54842617), with Kushnerick (US 4827069) incorporated by reference in Collins.
2. With respect to claims 1, 6, and 7, Koves discloses a process for contacting hydrocarbon vapors with fluidized catalyst particles in a riser that comprises a series of redistribution sections (see Koves, column 1, lines 12-16, column 3, lines 36-50, column 4, lines 11-26 and Figures 1 and 2). Also, Koves discloses that solid particles and light hydrocarbons are introduced at the bottom of the vessel in order to form fluidized catalyst (see Koves, column 4, lines 46-67).

Koves does not disclose where the gaseous feed contains a sulfur-containing hydrocarbon, does not disclose where the disengagement zone is broader than the reaction zone, and Koves does not disclose transferring sulfur from the hydrocarbon to the fluidized sorbent particles. Koves does not exactly and expressly disclose where the fluidized bed has a particle density of at least about 20 lb/ft³.

However, Khare discloses circulating a sorbent material with a stream containing sulfur and to remove sulfur from the fluid stream and that the disengagement zone is broader than the reaction zone (see Khare, column 3, lines 11-16, column 10, lines 28-47 and Figure 2).

Khare discloses that the removal of sulfur can be necessary to meet sulfur emission requirements (see Khare, column 1, lines 23-27).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Koves to include circulating a sorbent material with a stream containing sulfur and to remove sulfur from the fluid stream in order for a hydrocarbon to sulfur emission requirements.

Also, Collins discloses a desulfurization method using a dense fluid bed reactor because such a reactor is preferred to maintain catalyst activity (see Collins, column 5, lines 1-9 and column 6, lines 53-55). Collins discloses that dense fluid bed reactor is disclosed by Kushnerick, which is incorporated by reference in Collins (see Collins, column 4, lines 47-57). Kushnerick discloses where the dense fluidized bed has an average particle density of 19-31 lb/ft³ (300-500 Kg/m³) (see Kushnerick, column 8, line 67 – column 9, line 14).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Koves to include a desulfurization method using a dense fluid bed reactor, having an average particle density of 19-31 lb/ft³, because such a reactor is preferred to maintain catalyst activity.

3. With respect to claim 2, Khare discloses where the solid sorbent particles have a mean particle size from about 20 to about 500 micrometers (see Khare, column 2, lines 63-67).

Art Unit: 1764

4. With respect to claim 3, Khare discloses where the velocity of the fluidization gas is in the range of from about 0.15 ft/s to about 20 ft/s (see Khare, column 11, lines 49-60).
5. With respect to claim 4, Khare discloses where the particles have a mean particle size from about 20 to about 500 micrometers (see Khare, column 2, lines 63-67) and where the particles have a bulk density of about 0.9 to 1.01 (see Khare, column 14, Table 1). According to Applicant's specification, particles with the above size and density qualify the solid sorbent particles as a Group A under the Geldart group classification system (see Specification page 12, lines 1-9).
6. With respect to claim 5, Koves discloses where the fluidized bed is above the catalyst inlet (see Koves, Figure 1).
7. With respect to claims 8 and 9, Koves discloses where catalyst is withdrawn above the feed inlet and where both the feed inlet and the catalyst withdrawal are below the baffles (see Koves, column 5, lines 34-40 and Figure1).
8. With respect to claim 10, Khare discloses where the sorbent contains nickel (see Khare, column 5, lines 25-39).
9. With respect to claim 11, Khare discloses where the sorbent comprises zinc oxide and where the zinc oxide is converted to zinc sulfide to form sulfur loaded particles (see Khare, column 11, line 1).
10. With respect to claim 12, Khare discloses where the sulfur-loaded particles are regenerated with oxygen (see Khare, column 11, lines 1-5 and column 12, lines 52-65).

Art Unit: 1764

11. With respect to claim 19, Koves does not disclose the height to weight ratio of the reactor and fluidized bed. However, changes in shape are a matter of choice which a person of ordinary skill in the art at the time of the invention would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant (see MPEP 2144.04IV. B., citing *In re Dailey*, 357 F.2d 669 (CCPA 1966)).

12. Claims 13-15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koves in view of Khare as applied to claim 12 above, and further in view of Khare (US 6184176), hereinafter "Khare 2". Koves in view of Khare disclose everything in claim 12 (see paragraph 15) and Khare discloses where the regenerated catalyst is recycled back to the reactor (see Khare column 13, lines 54-66) and where the sorbent contains a promoter metal component comprising nickel (see Khare, column 5, lines 25-39) but do not disclose where the regenerated sorbent is sent to a reducer where hydrogen reduces the valence of the promoter metal.

However, Khare 2 discloses subjecting a promoter metal to a reduction step where the metal is contacted with hydrogen in order to reduce the valence of the promoter metal (see Khare 2, column 5, lines 59-67).

Khare 2 discloses where the promoter metal having reduced valence permits removal of sulfur from a cracked-gasoline stream or diesel-fuel stream (see Khare 2, column 5, line 65 – column 6, line 3).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Koves in view of Khare to include

Art Unit: 1764

subjecting a promoter metal to a reduction step where the metal is contacted with hydrogen in order to reduce the valence of the promoter metal to permit the removal of sulfur from cracked-gasoline or diesel fuel.

13. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koves in view of Khare as applied to claim 1 above, and further in view of Walker (US 2931711). Koves in view of Khare disclose everything in claim 1 (see paragraph 6) and Koves discloses where the reactor contains grids that each contain a series of parallel elongated baffles (see Koves, column 4, lines 41-54, column 7, lines 12-32 and Figures 1-4).

Koves in view of Khare do not disclose where the baffles of each grid are not parallel to baffles in other grids and create angles in the range from about 60 to about 120 degrees.

However, Walker discloses a reactor having stacked trays that each have parallel tubes and that the trays can be arranged so that the tubes of other trays are not parallel with other tubes in different trays and form angles between greater than 0 up to about 90 degrees (see Walker, column 3, lines 1-23 and 54-63 and Figures 2-6).

Walker discloses that such a configuration aides in fluidization of a reactor (see Walker, column 1, lines 56-72).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Koves in view of Khare to include a reactor having stacked trays that each have parallel tubes and that the trays can be arranged so that the tubes of other trays are not parallel with other tubes in different

Art Unit: 1764

trays and form angles between greater than 0 up to about 90 degrees in order to aide in reactor fluidization.

Response to Arguments

Applicant argues that one skilled in the art would not employ the baffles of Koves in a dense phase reactor because the baffles of Koves are included to aid in problems associated with dilute phase conditions. However, Koves discloses that the radial spokes are advantages in keeping most of the riser cross section open for fluid and particle flow and that the number and configuration can be optimized for a given design configuration (see Koves, column 3, lines 51-65). Therefore, Koves does not limit the use of the use of the baffles strictly to dilute phase reactions.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1764

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Douglas whose telephone number is 571-272-1087. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCD

4/15/2007



Glenn A. Caldarola
Supervisory Patent Examiner
Technology Center 1700